FROM THE STONE AGE TO THE SPACE AGE: SANTA SUSANA FIELD LABORATORY CULTURAL HISTORY

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A number of prehistoric sites, including rock shelters, pictograph sites, occupation sites, and isolated artifacts, have been documented on Santa Susana Field Laboratory property. During the nineteenth century, the property was ranch and cattle land. Later, western movies were shot among the large sandstone outcrops. In the 1950s and 1960s, Rocketdyne developed rocket engines here. The Atlas, Thor, Jupiter, Apollo, and Saturn rocket systems were powered by massive Rocketdyne engines. Today, the lab is jointly owned by Boeing, the Department of Energy, and NASA. The lab is currently being closed, and cleanup efforts are under way.

The Santa Susana Field Laboratory (SSFL) is located 30 mi. (48 km) northwest of downtown Los Angeles, California, in the southeast corner of Ventura County. The site is located approximately 7 mi. (11 km) northwest from the community of Canoga Park. Sage Ranch, part of the Santa Monica Mountains Conservancy, is adjacent to part of the northern boundary, and the community of Bell Canyon is along the entire southern boundary.

SSFL occupies approximately 2,850 acres of hilly terrain, with approximately 700 ft. of topographic relief near the crest of the Simi Hills. The Simi Hills are bordered on the east by the San Fernando Valley and to the north by the Simi Valley.

The facility is divided into four administrative areas (Figure 1). Areas I and III are owned and operated by Boeing. Area II and a 42-acre portion of Area I are owned by the federal government and are administered by NASA. Area IV is owned and operated by Boeing for the U.S. Department of Energy (DOE), which has long held a lease on that land.

Area IV consists of 290 acres located in the northwestern portion of the SSFL property where final demolition and remediation activities will occur (Figure 2). The present Northern Buffer Zone (NBZ), formerly known as the Northern Undeveloped Land, abuts the northern boundary of Area IV and includes approximately 182 acres. The NBZ is characterized by steep, nearly barren sandstone outcrops and dense chaparral on the less rocky slopes.

Because of the SSFL's location near the summit of a low mountain range in a semi-arid environment, water is scarce, and it is restricted to intermittent drainages. Several tributary streams to the Los Angeles River have headwater watersheds on the SSFL property, including Bell Creek, Dayton Creek, Woolsey Canyon, and Runkle Creek.

The geology of SSFL is characterized by steep outcrops of the Chatsworth Formation, a thick sequence of steeply dipping sandstone beds interbedded with siltstone that are conspicuous features of the site (Figure 3). The Chatsworth Formation formed on submarine fans and was subsequently faulted, offset, and rotated to its current location.

PREHISTORY

Santa Susana Field Laboratory is located near the boundary of the Chumash, Tataviam, and Fernandeño/Gabrielino Native American ethnographic groups. Kroeber (1925) places the present study area within the Chumash territory, near the border of Fernandeño/Gabrielino territory.

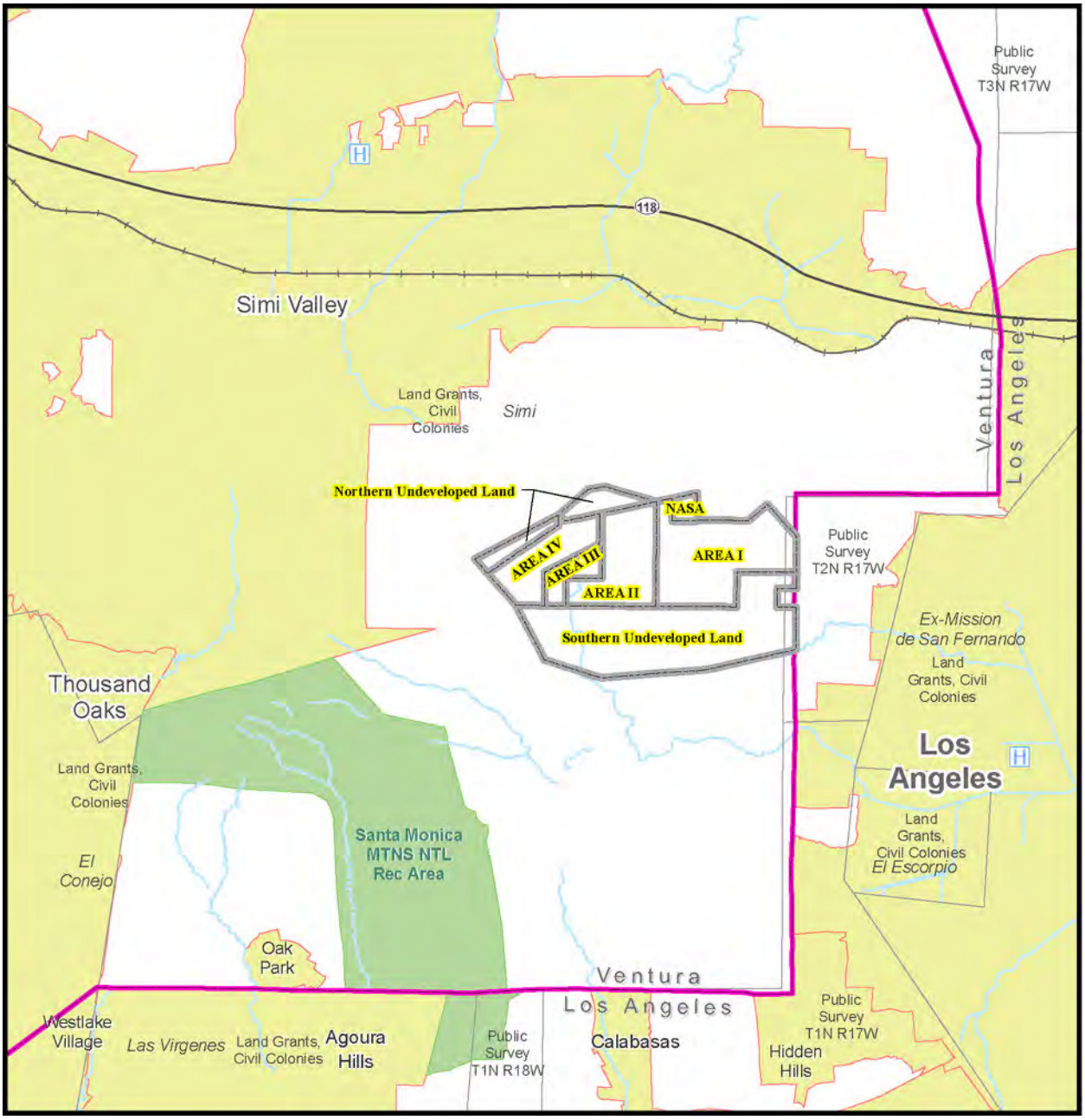

Figure 1. Santa Susana Field Laboratory location and administrative units.

John Peabody (J.P.) Harrington (1884-1961) was employed by the Bureau of American Ethnology as an ethnologist from 1915 to 1954 (Golla 1991). During this time, he conducted numerous interviews with local Native American informants. An interesting note appears in Harrington's Field Notes Fernandeño Reel #106 (Harrington n.d.). He reported (in 106-153:6:1) that "Melendrez's grandmother told him that at the Potrero de los Burros there used to be a very large Rancheria." This note seems to indicate the existence, at least at one time, of a Native American village in the vicinity of present-day Burro Flats. In another note (106-153:6:3), Harrington recorded, "There are painted caves which inf. [informant] knows near the Potrero de los Burros." This note appears to refer to the pictograph site at Burro Flats.

Figure 2. Aerial photo of Area IV of Santa Susana Field Laboratory (1985).

Area II of the SSFL contains the well-known archaeological and pictograph site known as Burro Flats (CA-VEN-1072, formerly VEN-151 to VEN-161). The site is not within the geographic area locally known as Burro Flats, but in a nearby canyon. The site was reportedly named after the nearest named geological feature (Knight 2001:48). This site was first visited by Mark Raymond Harrington during the 1940s, although no published account of this visit exists (Knight 2001:11). During the 1950s, Charles La Monk visited the Burro Flats site as a part of the work of the Archaeological Survey Association of Southern California. At the time, he painted several full-size reproductions of some of the Burro Flats rock art and published some information regarding this work (La Monk 1953). La Monk's collection of over 100 paintings from a dozen or more sites is now curated at the San Bernardino County Natural History Museum (Knight 2001:11).

In 1959, Charles Rozaire published a short article entitled "Pictographs at Burro Flats" in which he described the main panel at Burro Flats (Rozaire 1959). In addition, Rozaire completed 11 site record forms for the complex in 1960 (VEN-151 to VEN-161) and directed field excavation classes from San Fernando State College (now California State University Northridge) (Knight 2001:11). Unfortunately, no report of these excavations is available.

Campbell Grant published his seminal study of Chumash rock art in 1965 (Grant 1965). Grant (1965:Plates 25 and 30) illustrated the main panel at the Burro Flats site, which he identified as V-4. He also included a black-and-white photograph of the Burro Flats site (Grant 1965:Figure 98).

In 1973, Franklin Fenenga of the California State University Long Beach Anthropology Department conducted an archaeological survey of the area of Air Force Plant 57, Coca Test Area at the

Figure 3. Chatsworth Formation sandstone "reefs."

Santa Susana Field Laboratory (Fenenga 1973). This area included the Burro Flats site. Fenenga observed a midden deposit, measuring 525 by 215 m and 1.5 m deep, which was the primary component of the site. He described the site as "one of the most elaborate, and probably the best preserved painted petroglyph [sic] sites in California" (Fenenga 1973:9). He also noted both cupule petroglyphs and bedrock mortars at this location (Fenenga 1973:35).

Albert Knight (2001) described the Burro Flats site as containing at least eight pictograph panels and 14 distinct petroglyph concentrations, which include true petroglyphs, cupules, incised rocks, and bedrock mortars (Knight 2001:47). The individual rock art components include polychrome pictographs, red-only pictographs, black-only pictographs, white-only pictographs, orange-only pictographs, blue-only pictographs, four petroglyphs, cupules, and multiple crude grooves (Knight 2001:47). According to Knight (2001:47), Locus 10 is the finest extant example of a regional (i.e., Simi Hills/Santa Susana Mountains) sub-style of the Chumash Painted Style. Knight suggests that Locus 10 (formerly VEN-160) is one of the best preserved and most spectacular pictograph sites anywhere in southern California (Knight 2001:48). Locus 10 panel was listed on the National Register of Historic Places (NRHP) in 1972 (Listing #76000539) (Knight 2001:48).

HISTORY

During the 1860s, a few white settlers moved into Simi Valley. A branch of the Butterfield Line ran over the old Fremont Grade (now Santa Susana Pass) daily from Santa Barbara to a connection with the main Butterfield Line near present-day Pacoima (Cameron 1963:7-8). At this time, the Santa Susana Pass was a favorite hideout of several gangs of bandits (Cameron 1963:19).

Although Ventura County was considered backward and distant from the large population centers, in the late nineteenth and early twentieth centuries, there was a flurry of subdivision with some emphasis on Simi Valley (Cameron 1963:27). The towns of Simi and Santa Susana both resulted from this real estate boom (Hoover et al. 1966:581). These communities are now considered part of the Greater Los Angeles metropolitan area.

Prior to its development, the land encompassing SSFL was ranch land. From 1939 through 1954, SSFL's rugged terrain provided the backdrop for many Western movies. As an example, "The Kansas Terrors," released in 1939, was filmed on location at Burro Flats and Simi Hills. The unlikely synopsis for this film states, "Stony and Rusty venture to a Caribbean Island to sell horses to a ruthless Comandante" (Reid 2006). Other movie titles included, "Adventures of Red Ryder," "Robin Hood of the Pecos," "California," "Utah Wagon Train," "Shadows of Tombstone," "They Rode West," and "Iron Mountain Trail," to name a few.

In 1969, Charles Manson and his followers lived at the nearby Spahn Ranch (now Santa Susana Pass State Historic Park). In the 1970s, SSFL was used for numerous TV shows, including the "Six Million Dollar Man," "Bionic Woman," "Wonder Woman," "Cannon," and "Barnaby Jones." SSFL was also the scene of science fiction movies, most notably Star Wars, which filmed some of its computer-bank scenes in a test stand blockhouse (American Institute of Aeronautics and Astronautics 2001).

COLD WAR/ROCKET ERA

SSFL is a relic of the Cold War, when, after the end of World War II, it became clear that the character of the world had changed and onetime allies of the United States had become potential enemies (American Institute of Aeronautics and Astronautics 2001). Weapons systems which had previously been viewed as offensive weapons, such as long range missiles, now began to be viewed as defensive systems which could be used as deterrents to aggression. Also, the success of the German V-1 and V-2 rockets spurred the United States to develop its own missile development programs (American Institute of Aeronautics and Astronautics 2001).

In 1947, North American Aviation (a predecessor company to the Boeing Company, fired its first rocket engine in the company parking lot then located near Los Angeles International Airport. A need for a more remote site led to the Santa Susana Mountains near Canoga Park. The remoteness of the area, along with the natural noise-dampening qualities of its rocky bowls and hillsides, made it an excellent site for engine testing (American Institute of Aeronautics and Astronautics 2001). The location was also chosen because the work was considered too dangerous to be performed in more densely populated areas.

In 1948, North American Aviation began using what is now known as the northeastern portion, or Area I, of SSFL. Activities included research, development, and testing of liquid-fueled rocket engines and associated components such as pumps and valves (U.S. Department of Energy n.d.). A factory and offices were built on Canoga Avenue in Canoga Park, where the engine plant manufactured deliverable rocket engines (McCarthy 1997:461).

The majority of SSFL was acquired with the purchase of the Silvernale property in 1954, and the development of the western portion of the SSFL began soon thereafter (U.S. Department of Energy n.d.). Undeveloped land parcels to the south of the SSFL were acquired in 1968 and 1976 and to the north in 1998 (U.S. Department of Energy n.d.). Much of the development in Area IV took place in an area called Burro Flats, the largest area with relatively flat topography.

Predecessor companies to Boeing have included the Rocketdyne Propulsion and Power Division (Rocketdyne) of North American Aviation (NAA) and the Rockwell International Corporation. The majority of rocket engine testing and ancillary support operations took place from the 1950s through the early 1970s. These operations were conducted by Rocketdyne in Areas I and II on behalf of NASA. The Atlas, Thor, Jupiter, Apollo, and Saturn rocket systems were developed and propelled using massive Rocketdyne engines (McCarthy 1997:464). The spacecraft that carried John Glenn, the first American to orbit the earth, was launched using an Atlas rocket. Jupiter was used to launch monkeys in ballistic trajectories and for three satellites. Thor was used for unmanned satellites and, renamed Delta, was used as an intermediate-weight satellite launcher for over 40 years (American Institute of Aeronautics and Astronautics 2001). The Apollo 11 moon landing was accomplished using 30 various-sized Rocketdyne engines (American Institute of Aeronautics and Astronautics 2001). During the Apollo missions, SSFL employed some 6,000 workers and ran three shifts a day, and usually weekends (American Institute of Aeronautics and Astronautics 2001; McCarthy 1997:462).

Rocketdyne also produced the Space Shuttle Main Engine. Every shuttle launch since the program began in 1981 used the company's Space Shuttle Main Engine. It was the only engine rated for human space flight (Ventura County Star 2011a). Also at this time, Rocketdyne began developing an updated Intercontinental Ballistic Missile (ICBM), the Peacekeeper Missile (called the MX at the time) (American Institute of Aeronautics and Astronautics 2001). Rocket engine testing decreased during the 1980s and 1990s, and ceased entirely in 2006.

In addition to the primary facility operation of rocket engine testing, SSFL was used for research, development, and testing of water jet pumps, lasers, and liquid metal heat exchanger components; nuclear energy research; and research and development of related technologies.

Nuclear energy research, testing, and support facilities were located in the 90-acre portion of Area IV that was leased to the DOE. From the 1950s through the 1980s, this research included: nuclear energy operations (development, fabrication, disassembly, and examination of nuclear reactors, reactor fuel, and other radioactive materials) and large-scale liquid sodium metal experiments for testing liquid metal fast breeder reactor components. DOE's Energy Technology Engineering Center (ETEC) is located within Area IV. The ETEC's historic mission involved nuclear research and development for the U.S. Atomic Energy Commission, a predecessor to DOE. In the mid-1950s, a part of Area IV was set aside for nuclear reactor development and testing – primarily related to the development of nuclear power plants and space power systems, using sodium and potassium as coolants. In the mid-1960s, the ETEC was established as a DOE laboratory for the development of liquid metal heat transfer systems to support Office of Nuclear Energy Liquid Metal Fast Breeder Reactor program. Other operations focused on applied engineering and

development of emerging energy technologies to include solar and fossil energy as well as developing an energy conservation methodology.

Several small nuclear reactors were operated in Area IV. In 1959, one of the nuclear reactors experienced a power surge that damaged some of its fuel rods and resulted in a partial meltdown (Ventura County Star 2011b). Nuclear energy activities in Area IV ceased in 1988 (U.S. Department of Energy n.d.).

Throughout its history as a working laboratory, SSFL was classified as a sensitive or secure location. Aircraft were forbidden to fly over, and members of the general public were not admitted (McCarthy 1997:463). The secret nature of SSFL served to protect its natural and archaeological resources, at least those located outside of the developed area.

ARCHAEOLOGICAL AND ARCHITECTURAL STUDIES

In 2001, an archaeological survey of Area IV was completed by W&S Consultants (2001). Four archaeological sites were recorded, including a small rockshelter containing a single pink painting of a burro, of unknown cultural origin and age; a small rockshelter containing two pieces of lithic debitage and a fire-blackened ceiling; a single bedrock mortar; and a small rockshelter with a midden deposit (W&S Consultants 2001).

A cultural resources survey of the NBZ was conducted in 2010 by CRM TECH (2010). Three prehistoric lithic scatters were recorded during this study, one of which contained a natural water cistern, or *tinaja* (CRM TECH 2010). In addition to the three archaeological sites, five isolated prehistoric artifacts were identified (CRM TECH 2010).

Architectural resources were documented in a 2009 study; this study evaluated the NRHP eligibility of SSFL Area IV structural resources on an individual basis, as members of building groups, and as potential members of a historic district (Post/Hazeltine Associates 2009). In many cases, all buildings within groups had been demolished. Of 32 groups of buildings, 12 had at least one building still standing. Over 270 structures once stood in Area IV, but in 2009 fewer than 30 remained (Post/Hazeltine Associates 2009).

RECENT HISTORY

Most nuclear research-related programs and operations ceased in 1988. Beginning in the 1990s, activities in Area IV focused on decontamination and decommissioning (D&D) of former nuclear facilities, and environmental remediation. In 1996, Rocketdyne merged into the Boeing Company in a corporate acquisition of the aerospace divisions of Rockwell International. In 2006, Rocketdyne was sold to Pratt-Whitney. The Boeing Company retained ownership and operations of all of its previously owned lands at Santa Susana, including all of Area IV.

In 2010, Boeing and DOE reached a formal and binding cleanup agreement with the State of California. Under an agreement with DOE, the U.S. Environmental Protection Agency (EPA) is presently conducting radiological gamma surveys and soil sampling of Area IV and the NBZ of SSFL. These radiological surveys and soil sampling will be used to locate and characterize sources of radiological contamination associated with prior nuclear energy research conducted within Area IV of the SSFL. Environmental Protection Agency plans call for avoidance, protection, or mitigation for any impacts to cultural resources. In addition, DOE will use the results of these surveys for the evaluation of the environmental impacts resulting from further cleanup of SSFL and for the planning of those cleanup actions.

The information collected as a result of the cultural resources surveys will also be used as a basis for consultation with the State Historic Preservation Officer (SHPO) in compliance with Section 106 of the National Historic Preservation Act (NHPA). The information developed as a result of the surveys will

also be used to develop the cultural resources sections of the Environmental Impact Statement for Santa Susana Field Laboratory Area IV.

SUMMARY

Recent archaeological surveys and monitoring of soil sampling have effectively quadrupled the number of known archaeological sites at SSFL. Because of this, a much clearer picture of the area's prehistoric settlement and use is emerging. Site types include rockshelters without midden; rockshelters with midden and bedrock milling features; rockshelters with midden, bedrock milling features, and pictograph and/or petroglyphs; lithic reduction sites; probable hunting stations; and at least one natural water cistern, or *tinaja*. It seems likely that the entire area was used for many centuries for hunting and collecting by the area's prehistoric inhabitants.

Current plans call for the demolition of all the structures associated with the rocket engine testing program. In the future, it seems likely that the land will revert to park land or open space.

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